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Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)				Complete if Known	
				Application Number	
				Filing Date September 30, 2003	
				First Named Inventor Lester F. Ludwig	
				Group Art Unit	
				Examiner Name	
Sheet	1	of	13	Attorney Docket Number 2738-21	

U.S. PATENT DOCUMENTS					
Examiner Initials *	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)			
	A1	US-1,947,020	02-13-1934	Ranger	
	A2	US-3,493,669	02-03-1970	Elbrecht et al.	
	A3	US-3,591,699	07-06-1971	Cutler	
	A4	US-3,612,741	10-12-1971	Marshall	
	A5	US-3,651,242	03-21-1972	Evans	
	A6	US-3,730,046	05-01-1973	Spence	
	A7	US-3,742,133	06-26-1973	Cohen	
	A8	US-3,805,091	04-16-1974	Colin	
	A9	US-3,813,473	05-28-1974	Terymenko	
	A10	US-3,878,748	04-22-1975	Spence	
	A11	US-3,956,959	05-18-1976	Ebihara et al.	
	A12	US-3,962,945	06-15-1976	Creager et al.	
	A13	US-4,075,921	02-28-1978	Heet	
	A14	US-4,080,867	03-28-1978	Ratanangsu	
	A15	US-4,117,413	09-26-1978	Moog	
	A16	US-4,122,742	10/31/1978	Deutsch	
	A17	US-4,151,368	04-24-1979	Fricke et al.	
	A18	US-4,182,213	01-08-1980	Iodice	
	A19	US-4,274,321	06-23-1981	Swartz	
	A20	US-4,318,327	03-09-1982	Toups	

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Examiner Initials *	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
		Country Code ³ - Number ⁴ - Kind Code ⁵ (if known)				
	B1	EP-0 574 213-A1	12-15-1993	Synaptics, Inc.		

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* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04.

³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

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First Named Inventor

Lester F. Ludwig

Group Art Unit

Examiner Name

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	A41	US-5,459,282	10-17-1995	Willis	
	A42	US-5,471,008	11-28-1995	Fujita et al.	
	A43	US-5,475,214	12-12-1995	DeFranco et al.	
	A44	US-5,565,641	10-15-1996	Gruenbaum	
	A45	US-5,585,588	12-17-1996	Tamura	
	A46	US-5,659,145	08-19-1997	Weil	
	A47	US-5,659,466	08-19-1997	Norris et al.	
	A48	US-5,665,927	09-09-1997	Taki et al.	
	A49	US-5,668,338	08-18-1997	Hewitt et al.	
	A50	US-5,675,100	10-07-1997	Hewlett	
	A51	US-5,741,993	04-21-1998	Kushimiya	
	A52	US-5,763,806	06-09-1998	Willis	
	A53	US-5,786,540	06-28-1998	Westlund	
	A54	US-5,827,989	10-27-1998	Fay et al.	
	A55	US-5,850,051	12-15-1998	Machover et al.	
	A56	US-5,852,251	12-22-1998	Su et al.	
	A57	US-5,932,827	06-03-1999	Osborne et al.	
	A58	US-5,969,283	10-19-1999	Looney et al.	
	A59	US-6,047,073	04-04-2000	Norris et al.	
	A60	US-6,051,769	04-18-2000	Brown, Jr.	

[illegible]

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				Filing Date	September 30, 2003
				First Named Inventor	Lester F. Ludwig
				Group Art Unit	
				Examiner Name	
Sheet	5	of	13	Attorney Docket Number	2738-21

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	²
	C1	"Biax True Stereo Pickups," product description, Musician's Friend catalog.	
	C2	"Korg's New Z-1 Helps Fiddler Keep His Funk", Music and Sound Retailer, Mar. 1998.	
	C3	"Synaptics Targets Vision, Sound processing."	
	C4	"Yamaha VL1", advertisement, Electronic Musician, Apr. 1994.	
	C5	APPELMAN, D. RALPH, The Science of Vocal Pedagogy, Theory and Applications, 1967, Indiana University Press, Bloomington, Indiana, USA.	
	C6	Biaxe Ragamaster, Box 15426, Stamford, CT, 06901-0426, USA.	
	C7	BICANIC, DANE, ed. Photoacoustic and Photothermal Phenomena III. 1992, vol. 69, Springer-Verlag, Berlin Heidelberg, Germany.	
	C8	BORMANS, JAN "MPEG-4 systems need specialized CPUs", Electronic Engineering Times, Jan. 25, 1999.	
	C9	Boss DF-2, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C10	Boss OC-2 Service Manual, Roland Corporation, 7200 Dominion Circle, Los Angeles 90040-3696, CA, USA.	
	C11	Boss SE-70 Super Effects Processor Algorithm Guide, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	

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	C12	Boss SE-70 Super Effects Processor Owners Manual, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C13	CP-40 Pitch to Midi Converter, Roland, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C14	DMP9-16 Digital Mixing Processor, Yamaha Corporation, PO Box 1, Hamatsu, Japan.	
	C15	DP/4, Ensoniq, 155 Great Valley Parkway, Malvern, PA 19355, USA.	
	C16	E-Bow, Heet Sound Products, PO Box 3312, 611 Ducommun St., Los Angeles, CA 90051, USA.	
	C17	EPSTEIN, "The Search for New Chemical Oscillators," in Chemical Instabilities, Nicolis and Baras (eds.), 1984, D.Reidel Publishing, Dordrecht/Boston/Lancaster.	
	C18	EPSTEIN, IRVING R, "New Chemical Oscillators", Non-Equilibrium in Chemical Systems, 1984, Springer-Verlag, Berlin/Heidelberg, Germany.	
	C19	Ernie Ball, Volume Pedal, Musician's Friend Catalog.	
	C20	Etc., PETER, Letter to Editor, Experimental Musical Instruments, Jun., 1996.	
	C21	EWI3020, AKAI Corporation, Box 2344 Fort Worth, TX 76113, USA.	
	C22	FIELD, RICHARD J., and NOYES, RICHARD M. "Oscillations in Chemical Systems IV Limit Cycle Behavior in a Model of a Real Chemical Reaction," J. Chem. Physics, Vol. 60, No. 5, Mar. 1974.	

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	C23	GI-10 Guitar-Midi Interface, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C24	GRAY, PETER, and SCOTT, STEPHEN K, "Chemical Oscillations and Instabilities," 1990, Clarendon Press, Oxford, Great Britain.	
	C25	GSP 21 LEGEND, Digitech, 8760 South Sandy Parkway, Sandy, UT 84070, USA.	
	C26	GZOWSKI, JOHN "Sirens and Sympathetics", Experimental Musical Instruments, Jun. 1997, vol. 12, No. 4.	
	C27	HARA, YOSHIKO "Matsushita demos multilayer MPEG-4 compression", Electronic Engineering Times, Apr. 19, 1999.	
	C28	JOHNSON, COLIN "Computer program recognizes facial expressions", Electronic Engineering Times, Apr. 12, 1999.	
	C29	JOHNSON, COLIN "Image sensor tracks moving objects in hardware", Electronic Engineering Times, Apr. 5, 1999.	
	C30	Kaoss pad dynamic effect/controller, Korg Proview Users' magazine, Summer 1999.	
	C31	KING and WHITE, "Tactile Sensing Array Based on Forming and Detecting an Optical Image," UC Berkeley Preprint.	
	C32	KURAMOTO, YOSHIKI, "Rhythms and Turbulence in Populations of Chemical Oscillators", Physica 106A (1981), pp. 128-143, North-Holland.	
	C33	LEIBERMAN, DAVID "Software goes on a search-and-locate mission", Electronic Engineering Times, Jan. 25, 1999, pp. 44.	

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	C34	LEIBERMAN, DAVID "Touch screens extend grasp into consumer realm" Electronic Engineering Times, Feb. 8, 1999.	
	C35	Light Wave Pickups, Audio Optics, Santa Barbara, CA., USA.	
	C36	LIM, AGRAWAL, and NEKLUDOVA "A Fast Algorithm for Labeling Connected Components in Image Arrays", Technical Report Series, No. NA86-2, Thinking Machines Corp., 1986 (rev. 1987), Cambridge, Mass., USA.	
	C37	Lord LTS-300T Tactile Array Sensor, Lord Corp., Ind. Aut. Div., 407 Gregson Dr., PO Box 8200, Cary, NC, 27511-8200, USA.	
	C38	LUDWIG, L., "A Generalized Linear Amplitude Processor," Electronotes, Dec. 1979, vol. 11, No. 108.	
	C39	LUDWIG, L., "A Square-Wave Frequency-Division Sub-Octave Cross-Product Module," Electronotes, Feb. 1979, Vol. 11, No. 98.	
	C40	LUDWIG, L., "GLAP Revisited," Electronotes, Jul. 1981, vol. 13, No. 127.	
	C41	LUSHER, E. (unk) "Photoacoustic effect: principles and applications: proceedings of the First International Conference on the Photoacoustics," 1984, Vieweg.	
	C42	MIDI Player MP-88, Miditemp, Max-Halbe-Strasse 1 85716 Unterschleissheim, Germany 0049-89-3-10-81-38.	
	C43	MOOG, ROBERT A. "The Human Finger-A Versatile Electronic Music Instrument Component", Audio Engineering Society Preprint, 1977, New York, NY, USA.	
	C44	MS4-M53 Solton, Ketrion Lab, dist. By Bell Duvoux Corp. 126 Rt. 303, 10994 W. Nyack, NY, USA.	

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	C45	MURPHY, AAMODT, Spicer and Royce (eds) Photoacoustic and Photothermal Phenomena II, 1990, vol. 62, Springer-Verlag, Berlin Heidelberg, Germany.	
	C46	NAGY-UNGVARAI, Z. and HESS, BENNO "Control of Dynamic Pattern Formation in the Belous-ov-Zhabotinsky Reaction" Physica D (1991) North-Holland.	
	C47	NICOLIS, G and BARAS, F (eds.), Chemical Instabilities, 1984, D.Reidel Publishing, Dordrecht/Bos-ton/Lancaster.	
	C48	NICOLIS, G., "Nonlinear Phenomena in Chemistry", Introduction to Nonlinear Science, 1995, Cambridge University Press, Great Britain.	
	C49	Omnichord OM-250m, Suzuki, Box 261030, San Diego, CA 92196, USA.	
	C50	ORBAN, M., KURIN-CSORGEI, K., ZHABOTINSKY, A, and EPSTEIN, I, "New Indicators for Visualizing Pattern Formation in Uncatalyzed Bromate Oscillatory Systems", J. Am. Chem. Soc. 1998, Vol. 120, pp. 1146-1150.	
	C51	PC-1600 Midi Controller, Peavy Corporation, 711 A St., Meridan, MS 39302-2898, USA.	
	C52	PENNYWITT, KIRK "Robotic Tactile Sensing," Byte, Jan., 1986.	
	C53	PLM 8128E, Peavey, Corporation, 711 A St., Meridan, MS 39302-2898, USA.	
	C54	PMC10 Program. MIDI Foot Controller, Digitech, Salt Lake City, UT, USA.	
	C55	Review of KORG X-230 Drum (later called "Wave Drum"), Electronic Musician, Apr. 1994.	

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	C56	RICH, ROBERT "Buchla Lightning MIDI Controller", Electronic Musician, Oct. 1991.	
	C57	RICH, ROBERT "Buchla Thunder", Electronic Musician, Aug. 1990.	
	C58	ROADS, C., "A Tutorial on Non-linear Distortion or Waveshaping Synthesis," Computer Music Journal, Vol. 3, No. 2, pp. 29-34, June 1979, People's Computer Company, Menlo Park, CA, USA.	
	C59	Robotic Tactile Sensig, Kirk Pennywitt, BYTE, Jan. 1986.	
	C60	Roland's COSM: A Whole New World of Sounds, Kikumoto/Meyer, Roland Users' Magazine. 7200 Dominion Circle, Los Angeles, CA, 90040-3696, USA.	
	C61	RONSE, CHRISTIAN and DEVIJVER, PIERRE A., Connected Components in Binary Images: the Detection Problem, 1984, Research Studies Press/ John Wiley & Sons Inc., New York, NY, USA.	
	C62	RSP-550 Algorithm Guide, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C63	RSP-550 Owners Manual, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C64	RUOFF, P. "How Bromate Oscillators Are Controlled", Am. Chem. Society, 1988.	
	C65	Sentient Six digital guitar interface, PASSAC, Milpitas, CA 95035, USA.	
	C66	SGE MACH II, Applied Research and Technology, 215 Tremont St., Rochester, NY 14608, USA.	

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	C67	SHAPIRO, LARRY S, Affine Analysis of Image Sequences, 1995, Press Syndicate of the Cambridge University Press.	
	C68	SLAWSON, WAYNE, Sound Color, 1985, University of California Press, Berkeley, CA, USA.	
	C69	SNELL, JOHN M. "Sensors for Playing Computer Music with Expression", Proceedings of the Intl. Computer Music Conf. at Eastman, 1983.	
	C70	Switchblade 16, Sound Sculpture, 5741 Arapahoe Rd. Ste. 2a Boulder, CO 80303, USA.	
	C71	Synthophone, Softwind Instruments, 304 Newbury St. Ste. 323, Boston, MA 02155, USA.	
	C72	Tactile sensors and the gripping challenge, IEEE Spectrum Aug. 1985.	
	C73	The Fretless Wizard, Blaxe, P.O. Box 15426, Stamford, CT, 06901-0426, USA.	
	C74	Trilogy, Hipshot Music Prods. Van Nuys, NY, USA.	
	C75	TYSON, JOHN J., The Belousov-Zhabotinskii Reaction, Springer-Verlag, Berlin/Heidelberg, Germany.	
	C76	Unlocking the Secrets of HRM (Harmonic Restructure Modeling), Craig Anderton, Roland Users' Magazine, 7200 Dominion Circle, Los Angeles, CA 90040-3696, USA.	
	C77	Various 6D Tracking Products, Ascension Technology Corporation, PO Box 527, Burlingame, VT 05402, USA.	

Examiner Signature		Date Considered	8/22/04
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)				Application Number	
				Filing Date	September 30, 2003
				First Named Inventor	Lester F. Ludwig
				Group Art Unit	
				Examiner Name	
Sheet	12	of	13	Attorney Docket Number	2738-21

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	C78	VERNER, J. <i>Arti Starr Switch Company Ztar 624-D, Electronic Musician</i> , Nov. 1994.	
	C79	VG-8 Users Manual, Roland Corporation, 7200 Dominion Circle, Los Angeles, CA, 90040-3696, USA.	
	C80	VIBERG, MATS, <i>Subspace Fitting Concepts in Sensor Array Processing</i> , Linkoping Studies in Science and Technology, 1989, Dissertations No. 27 Linkoping, Sweden.	
	C81	VISINTIN, A. (ed.), <i>Models of Hysteresis</i> , Longman Scientific & Technical, 1993, Harlow, England.	
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	C83	WESSEL, C., "A Tutorial on Non-linear Distribution or Waveshaping Synthesis", <i>Computer Music Journal</i> , Jun. 1979, Vol. 3, No. 2, pp. 29-34, People's Computer Company, Menlo Park, CA, USA.	
	C84	WILKINSON, SCOTT "SynchroVoice MidiVox" <i>Electronic Musician</i> , Jul. 1992.	
	C85	WINCKEL and FRITZ, <i>Music Sound, and Sensation: A Modern Exposition</i> , 1967, Dover, New York, USA.	
	C86	Wind Machine, Anatek, Creation Technologies, 400 Brooksbank Ave. B.C. Canada V7J-1G9	
	C87	WX11 and Wt11, Yamaha, 6600 Orangethorpe Ave., Box 6600, Buena Park, CA, USA.	
	C88	XSDR AI2 Synthesizer Module, KORG, Suginamiku, Tokyo, Japan.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)		Application Number	
		Filing Date	September 30, 2003
		First Named Inventor	Lester F. Ludwig
		Group Art Unit	
		Examiner Name	
Sheet 13 of 13	Attorney Docket Number	2738-21	

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	C89	Yamaha FS1R, Electronic Musician, Dec., 1998.	
	C90	Yamaha WX11 and WT11, Midi Magazine Mar./Apr. 1994. Yamaha Corp. of America, 6600 Orangethorpe Ave., PO Box 6600 Buena Park, CA 90622-6600, 714 522-9011.	
	C91	ZTAR Midi Fingerboard Controllers-Starr Instruments/Starr Switch, 1717 Fifth Ave., San Diego, CA 92101, USA.	

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